

**CITY OF ABILENE
REBUILD OF VERTICAL TURBINE PUMPS
MINIMUM SPECIFICATIONS AND BID FORM
BID #CB-2126**

The City of Abilene is in need of a rebuild of vertical turbine pumps #1 & #3, located at its Lake O.H. Ivie Pump Station located at the Lake O.H. Ivie Reservoir (GPS COORDINATES: 31.5778, -99.7241) (Lat. / Long.: 31°34'40.1"N 99°43'26.8"W). The pumps to be rebuilt are described as: Pump #1, RuhrPumpen Model 26CKXL – 5 stage vertical turbine pump rated at 5,200 GPM @560 ft. TDH @1185 RPM and Pump #3, Hydroflo 18HH6C-13994-w – 6 stage vertical turbine pump rated at 6,000 GPM @ 560 ft. TDH @ 1800 RPM.

The Contractor shall be responsible for a turn-key project which includes, but is not limited to, pre-removal field testing and inspection services, supplying all parts, labor, machining, cleaning, transportation, equipment, and related materials required to pull and repair the pumps. Repair shall bring clearances of all machined and replaced parts to within the manufacturer's tolerances and the noise, vibration, and performance of the overhauled pumps within industry standards. Work includes reinstallation and post repair field testing performance verification and inspection services. For information purposes only, the following describes related equipment: Pump #1 Motor, TECO Westinghouse. Nameplate: 1000 hp, 1185 RPM, 133 fla, 4160 volt, 450A WP1 frame vertical solid shaft induction motor, and Pump #3 Motor, US Motors 1250HP Titan-HT VSS, type WPI Frame 5813 VP, 30.50" B.D., 1800 RPM, 3PH/60Hz/4160V, S.F. 1.15 Shaft dia.3.875" w/1.00" Key, Type RVEI4 solid shaft induction motor.

The pumps service is raw water from a lake source. The pumps are wet well/barrel mounted.

THE BIDS WILL BE COMPETITIVELY EVALUATED BASED ON THE SUM TOTAL OF TOTAL ITEM A BID AND TOTAL ITEM B BID. The City of Abilene may award the contract to the lowest responsible bidder. The City reserves the right to reject any or all bids. The selected Bidder must agree to the terms and conditions of the City's standard contract form by signing the contract prior to the award of bid. A copy of the contract template is included in the Invitation to Bid packet. The bidder should include in the bid submission a marked copy of the contract template making note of any requested exceptions for consideration by the City Attorney.

ITEM A. The Contractor shall provide the following, Itemized essential parts for unit pricing:

ITEM	DESCRIPTION	QUANTITY PER PUMP 1	UNIT PRICE PUMP 1	TOTAL PUMP 1	QUANTITY PER PUMP 3	UNIT PRICE PUMP 3	TOTAL PUMP 3
1.	PUMP AND MOTOR MECHANICAL DISCONNECT, PULL, TRANSPORT, REINSTALL, MECHANICAL RECONNECT	1			1		
2.	SHOP DISASSEMBLY, INSPECTION, REASSEMBLY	1			1		
3.	STANDARD BLASTING, CLEANING, EPOXY RECOATING	1			1		
4.	NEW BOLTS, WASHERS & NUTS THROUGHOUT	1			1		
5.	REWORK LINE SHAFTS	1 @ 95" 2 @ 60" 6 @ 120" 1 @ 210.50"			1 @ 129.48" 6 @ 120" 3 @ 60" 1 @ 70.5"		
6.	REWORK COUPLINGS	9			10		
7.	REPLACE VIBRATION SENSORS WITH METRIX MODEL 440 VIBRATION SWITCHES	2			2		
8.	BUILDUP AND MACHINING OF COLUMN REGISTERS	2 @ 60" 6 @ 120" 1 @ 41.62"			6 @ 120" 3 @ 60"		
9.	NEW BOWL BEARINGS	10			12		
10.	NEW BOWL BEARINGS (420SS, 300BHN)	10			12		
11.	NEW IMPELLER WEAR RINGS (410SS, 150BHN)	5			6		
12.	NEW LINE SHAFT BEARINGS	8			8		
13.	STANDARD MACHINING WORK	1			1		
14.	BALANCE IMPELLERS	5			5		
15.	ALL REMOTE AND LOCAL MEASURING AND PERFORMANCE TESTING	1			1		
	TOTAL BID – ITEM A						

Following is a list of general tasks anticipated in support of the above line items.

1. **Initial Field Work:** *Perform pre-removal field performance test.*
 - A. Using contractor supplied calibrated flow meter and pressure gauge, determine pumps flow at three (3) total head points along with shaft speed at 100% speed (60 Hz).
 - B. Measure the vibration amplitude (filtered and unfiltered) at the top of the motor in three planes (TM-0, TM-90, and TMV).
 - C. Perform an Impact test in two planes to determine natural frequencies.

- D. Measure shaft and coupling runout in mils t.i.r. prior to uncoupling.
 - E. Once the motor is removed, measure and record level at top of discharge head in two planes with a machinist's level, precision straight edge, and 1-2-3 blocks.
 - F. Prior to pump removal disconnect from piping and note any piping misalignment to pump.
 - G. Once pump is removed, again measure level, but on the machined surfaces of the sole plate.
 - H. Inspect the condition of the grout and anchor bolts. Remove sole plate if bearing surface is corroded or if the level exceeds a tolerance of 0.002"/12" of span in either plane.
 - I. Prior to removal of sole plate accurately measure distance from sole plate surface to the wet well bottom and to the discharge centerline.
2. **Removal of Pumps:**
- A. Disconnect the electrical wiring from the motor.
 - B. Remove any control piping or wiring related to pump operation.
 - C. Separate motor from pumps.
 - D. Disconnect pump outlet flanges and inlet flanges.
 - E. Pull pumps. Contractor to furnish field service men for removal and loading of pumps.
 - F. Supply equipment to load pumps for transport at jobsite.
3. **Transport Pumps Components to Shop:**
- A. Furnish truck with trailer sufficient to transport complete pump units to contractor's shop.
 - B. Contractor to furnish field service men for loading of pumps.
 - C. Contractor to furnish all dunnage and rigging to safely and securely haul pumps to shop.
 - D. Contractor shall protect pumps from damage during transit.
4. **Inspection and Tear Down:**
- A. Prior to disassembly. Measure and record bowl assembly length, column lengths, discharge head length, and other pertinent dimensions and produce an As Found Setting Plan.
 - B. Disassemble each component of the pumps and the bowl and clean sufficiently to make accurate measurements of the following dimensions. Take digital photos during the disassembly and inspection process.
 - a. Disassemble the bowl assembly to make accurate measurements of the critical components.
 - i. Measure and record shaft runout.
 - ii. Measure and record "as found" impeller unbalance.
 - iii. Measure and record "as found" dimension on shaft journals, bearings, and wear rings.
 - iv. CNC Inspection to include measurement of machining tolerances of all column pipes, enclosing tubes, and motor pedestal. Measurements will include flange parallelism, flange flatness, aligning register center concentricity, and aligning register diameter.
 - b. Digital photos to be taken during the disassembly and inspection process.
 - c. A written report to be submitted to document the "as found" condition.
 - d. Report shall detail clearances of all critical machined surfaces.
 - e. Report shall note any problems, special conditions, and/or unusual wear or corrosion.
 - f. Report shall describe all broken, damaged, and worn parts with reference to the corresponding manufacturers' specifications/tolerances.
 - g. Report will identify the necessary actions for rehabilitation including recommendation on the given allowances.
 - C. Furnish report with photos, inspection results, conclusions, and recommendations within 13 days working days of receiving the pumps.

5. **Standard Repair:**

- A. Clean, polish, and straighten bowl shaft to 0.003" t.i.r. or better at the top, middle, and bottom of shaft. Face line shaft end perpendicular to shaft centerline.
- B. Perform one or two plane dynamic balance on impeller(s) to meet ISO Grade G2.5 or better.
- C. Remove bearing from suction bell. Grit blast bell to SSPC-SP-10 Near White. *(Repair any significant pitting in the water way with a proven metal repair epoxy compound from a reputable supplier like Belzona or Chesterton. Coat entire waterway with Belzona 1341 Super Metal Glide epoxy to the thickness specified by the OEM.)* Coat the exterior of the suction bell with TNEMEC Series 140 Pota-Pox potable water epoxy to a dry film thickness of 12 mils dft. Topcoat color to be Tank White. Make a new bronze suction bell bearing and install.
- D. Remove bearing from bowl(s). Remove the case wear ring(s) from the bowl(s). Grit blast bell to SSPC-SP-10 Near White. *(Repair any significant pitting in the water way with a proven metal repair epoxy compound from a reputable supplier like Belzona or Chesterton. Coat entire waterway with Belzona 1341 Super Metal Glide epoxy to the thickness specified by the OEM.)* Coat the exterior of the suction bell with TNEMEC Series 140 Pota-Pox potable water epoxy to a dry film thickness of 12 mils dft. Topcoat color to be Tank White. Make a new bronze bowl bearing and install. Make a new stainless steel case wear ring and install.
- E. Replace bowl flange fasteners with 18-8 stainless steel.
- F. Clean, polish, and straighten line shafts and head shaft to 0.003" t.i.r. or better at the top, middle, and bottom of shafts. If journals are worn, plan to flip shafts end for end to establish a new journal area. Face both ends of each line shaft and the bottom end of head shaft to be perpendicular to shaft centerlines.
- G. Remove column bearings. Grit blast each column to SSPC-SP-10 Near White. Coat inside and outside of each column in the non-machined areas with TNEMEC Series 140 Pota-Pox potable water epoxy to a dry film thickness of 12 mils dft. Topcoat color to be Tank White.
- H. Replace line shaft bearings with phenolic backed fluted "low swell" nitrile rubber bearings (open line shaft, product lubricated units only).
- I. Remove stuffing box bearing from stuffing box.
- J. Grit blast stuffing box and discharge head to SSPC-SP-10 Near White. Coat inside and outside of each column in the non-machined areas with TNEMEC Series 140 Pota-Pox potable water epoxy to a dry film thickness of 12 mils dft. Topcoat color to be Blue.
- K. Make and install new bronze stuffing box bearing.
- L. Replace column flange fasteners with 18-8 stainless steel fasteners.
- M. Replace discharge head fasteners with 18-8 stainless steel fasteners.
- N. Assemble unit and install stuffing box. Use RAINS-FLO GFM packing.
- O. Assemble bowl assembly.
- P. Adjust impellers to manufacturer's specifications.
- Q. Perform concentricity & parallel check of columns, discharge head, and bowl assemblies and repair to manufacturer's specifications.

6. **Additional Work: (Some, none, or all of the following additional work may be performed as determined by the inspection and ordered by the Owner.)**

- A. Rebuild or make a new 416 stainless steel bowl shaft.
- B. If one sided bearing wear is found in suction bell and/or bowl or register clearance is too large, six (6) pad weld the register on the bell and the top register on the bowl. Use a nickel welding rod. Re-cut registers to be concentric with bearing bore (and other register for the bowl). Re-face flanges to be perpendicular to the bore centerline (and parallel to one another for the bowl).
- C. If column bearing wear is found to be one sided or register clearance is too large, six (6) pad weld the

register on one column flange. Use a stainless steel welding rod. Re-cut registers to be concentric with bearing bore. Re-face flanges to be perpendicular to the bore center line and parallel to one another.

- D. If a line shaft or the head shaft cannot be reused, make a new shaft in 416 stainless steel.
- E. If a line shaft coupling cannot be reused, furnish another stainless steel coupling.
- F. Re-manufacture the discharge head if shaft runout prior to removal exceeds 0.007" t.i.r., or one sided stuffing box bearing wear is found, or register clearance is too large. This includes six (6) pad welding both the column register and motor register and re-machining these registers to be concentric with stuffing box bore. Face motor flange, seal plate flange, and base flange to be parallel to one another and perpendicular to stuffing box bore.
- G. If corrosion, level, or grout condition requires the sole plate to be removed, perform the following work.
 - a. Grit blast sole plate. Leave bottom uncoated. Coat sides and top unmachined areas with 12 mils dft of TNEMEC Series Pota-Pox potable water epoxy. Topcoat Black.
 - b. Re-machine sole plate top bearing surface to clean up.
 - c. Remove grout from foundation and scarify concrete surface in preparation for new grout. Build inside form for grout.
 - d. Mount sole plate and discharge head on anchor bolts and set elevation to minimize distortion from piping strain.
 - e. Level top of discharge head to 0.002"/12" of span. Use removable shims or jack bolts to achieve level. Build outside form.
 - f. Mix up epoxy grout in a consistency that will pour and fill formed cavity.
 - g. Once cured, remove discharge head and wreck out forms. Measure and record sole plate level.

7. Transport Pump Components to Jobsite:

- A. Furnish truck with trailer sufficient to transport complete pump units to jobsite.
- B. Furnish all dunnage and rigging to haul pumps safely and securely to jobsite.
- C. Protect pumps from damage during transit.
- D. Supply equipment to unload pumps at jobsite.
- E. Furnish field mechanics to install pumps.
- F. Install pumps with new O-rings and hardware.
- G. Reinstall any control piping or wiring related to the pumps work.
- H. Reconnect the pumps outlet flange and inlet flange.
- I. All bolting shall be re-torqued once unit is hanging vertical.
- J. Mount the motor.
- K. Reconnect the electrical wiring to the motor.
- L. Reconnect the motor and pumps.
- M. Replace vibration meter with METRIX Model 440 Vibration Switch.
- N. Couple motor to pump and measure shaft and coupling runout. Max allowable runout of any shaft or coupling component is 0.005" t.i.r

8. Startup and Field Testing:

- A. Start unit and check for leaks, vibration, noise, and temperature.
- B. Perform field performance test as follows:
 - a. Using contractor supplied calibrated flow meter and pressure gauge, determine pump flow at three (3) total head points along with shaft speed. Do this for 100% (, 90%, 80%, and 70%) speed(s).
- C. Measure the vibration amplitude (filtered and unfiltered) at the top of the motor in three planes (TM-0, TM-90, and TMV). Unfiltered amplitudes must be within the Hydraulic Institute Standards limit of

- 0.2200000 in/sec rms at any one of these three points.
- D. Perform an Impact test in two planes to determine natural frequency.
 - E. Furnish an As Built and Field Startup report.
9. The Contractor shall warranty the pumps for one year against defects in workmanship and/or replaced parts and any ancillary damage resulting from the failure of those parts, and the warranty shall include all costs associated with removal, installation, transportation, parts, materials, and machining.
 10. After award of bid the City reserves the right to negotiate with the Contractor to pick and choose each of the above listed items and to authorize the substitution of a rebuilt or Contractor machined original part or an available like new used part in place of an item listed as new.

ITEM B. Repair or Replacement of Major Components not covered in Item A.

Unit Pricing for Other Major Components

ITEM	DESCRIPTION	MAXIMUM UNIT COST	
		Pump #1	Pump #3
1.	NEW IMPELLER		
2.	NEW BOWL ASSEMBLY		
3.	NEW PORT BODY		
4.	NEW BOWL SHAFT (416SS)		
5.	NEW LINE SHAFT (416SS)		
6.	NEW LINE COUPLING (410SS)		
7.	NEW 10' COLUMN		
8.	OPTIONAL SPECIALIZED COATINGS FOR IMPELLER AND VOLUTE (Belzona 1341) (Both Pumps)		
TOTAL BID – ITEM B			

Following is a list of general instructions related to the above Item B line items.

- Should inspection reveal damage to or failure of any major components, impellers, bowl assemblies, or columns, which are not included in Item A, the Contractor shall immediately notify the City providing part numbers and costs for the repair or replacement of those parts. The contractor is not to proceed with any additional repair work until directed to do so by the City.
- Provide the City with clear photographs and the opportunity to visit shop to visually inspect all damaged major components.
- As directed by the City, the Contractor shall repair or replace damaged major components, impellers, bowl assemblies, or columns and complete all work as described in Item A.

- The City must authorize each Item B expenditure and the price shall be no greater than the above listed Maximum Unit Cost.
- Disassembly and reassembly of Item B. Major Components is included in Item A, and no additional compensation is due the contractor.

Additional Responsibilities of the Contractor:

1. Perform all tasks as described in Item A and as necessary for Item B.
2. Delivery and Startup within 3-5 Weeks ARO.
3. Price FOB OH Ivie Intake Pumps Station.
4. Price Includes Pre-removal field testing and inspection services, Pumps Repair/re-manufacture services, Start-up and post repair field testing performance verification and inspection services.
5. Operation of the City's overhead crane equipment.
6. Provide all equipment and tools necessary to perform described work.
7. All costs of transportation to and from work site, shipping, and travel expenses are included in Contractor's proposed cost for Item A.
8. The Contractor is not responsible for the condition, performance, or balance of the Electric Motor unit.

Responsibilities of the City:

1. Operate valves as necessary to isolate and reactivate the pumps.
2. Provide an overhead crane device for operation by the Contractor.
3. The City reserves the right to terminate project at any time for any reason, and the City would likely exercise its right should the inspection of the pumps reveal damage of pumping unit parts resulting in excessive costs above that value of the contract. Should the City terminate the project the Contractor shall be paid for all real costs incurred by the Contractor up to the point of termination of project including the costs of returning the pumps to the city or for the proper disposal of the pumping unit by the Contractor, as determined by the City.

Company Name

Authorized Representative

Date

Address

Phone

Email